St. Lawrence High School

A Jesuit Christian Minority Institution

Term : 1st

Solution of Work Sheet – 3

Class – XI | Subject – Physics | Date – 17.06.20

Chapter – Motion in 1D | Topic – Uniformly accelerated motion

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Choose the correct option for the following questions. $1 \times 15 = 15$

1. A car starts from rest and accelerates at a constant rate along a straight line. In the first second the car covers a distance of 2m. The velocity of the car at the end of 1 sec will be –
   a. 4 m/s
   b. 8 m/s
   c. 16 m/s
   d. None
   Ans: b. 8 m/s
2. A ball is thrown upwards from the top of a tower 40m high with a velocity 10m/s. The ball goes up and then returning, touches the ground. What will be the total distance travelled by the ball before it touches the ground? (take g = 10 m/ s^2)
   a. 5m
   b. 45 m
   c. 90 m
   d. 50 m
   Ans: d. 50 m
3. In the above problem, what is the time taken by the ball to strike the ground is – (take g = 10 m/ s^2)
   a. 1 sec
   b. 2sec
   c. 3sec
   d. 4sec
   Ans: d. 4 sec
4. Water drops fall at regular intervals from a tap 5m above the ground. When the 3rd drop is leaving the tap, the 1st drop touches the ground. How far above the ground is the 2nd drop situated at that instant? ($g = 10m/s^2$)
   a. 1.25 m
   b. 2.5 m
   c. 3.75 m
   d. 4.00 m
   Ans: c. 3.75 m
5. A stone is dropped from the top of a tower and one second later, a second stone is thrown vertically downward with a velocity 20m/s. The 2nd stone will overtake the 1st stone after travelling a distance of (g = 10m/s^2) –
   a. 13m
   b. 15m
   c. 11.25 m
   d. 19.5 m
   Ans: c. 11.25 m

6. When a ball is thrown vertically up with velocity v_0, it reaches a maximum height of h. if one wishes to triple the maximum height then the ball should be thrown with velocity –
   a. $\sqrt{3v_0}$
   b. $3v_0$
   c. $9v_0$
   d. $\frac{3}{2}v_0$

   Ans: a. $\sqrt{3v_0}$
7. A lift performs the first part of its ascent with uniform acceleration a and the remaining with uniform retardation $2a$. If t is the total time of ascent, then the depth of the shaft is –
   a. $\frac{at^2}{4}$
   b. $\frac{at^2}{3}$
   c. $\frac{at^2}{2}$
   d. $\frac{at^2}{8}$

   Ans: b. $\frac{at^2}{3}$
8. Two objects are moving along same straight line. They cross a point A with an acceleration $a\ and\ 2a\ with\ velocity\ 2u\ and\ u$ respectively at time t = 0. The distance moved by the object when one overtake other is –
   a. $\frac{6u^2}{a}$
   b. $\frac{2u^2}{a}$
   c. $\frac{4u^2}{a}$
   d. $\frac{8u^2}{a}$

   Ans: a. $\frac{6u^2}{a}$
9. Two trains are moving with velocities $v_1 = 10m/s$ and $v_2 = 20m/s$ on the same track in opposite directions. After the application of breaks if their retardations are $2m/s^2$ and $1m/s^2$ respectively, then the minimum distance of separation between the trains to avoid collision is –
   a. 150 m
   b. 225 m
   c. 450 m
   d. 300 m

   Ans: b. 225 m
10. The velocity of a particle is given as a function of time as $v = (-2t + 40)m/s$. What will be the displacement of the particle in first 10 sec?
   a. 400 m.
   b. 350 m
   c. 300 m
   d. 250 m

   Ans: c. 250 m
11. The velocity-time graph of a particle in 1D motion is a straight line passing through origin and making an angle 60^0 with the positive x – axis. What will be the displacement of the particle in first sec if it stars from origin?
   a. $64\sqrt{3}\ m$
   b. $50\sqrt{3}\ m$
   c. $45\sqrt{3}\ m$
   d. $32\sqrt{3}\ m$

   Ans: d. $32\sqrt{3}\ m$

12. In the above problem, what will be the distance travelled by the particle when its velocity is just $20\sqrt{3}\ m/s$?
    a. $200\sqrt{3}$ m
    b. $150\ \sqrt{3}$m
    c. $100\sqrt{3}$ m
    d. $60\sqrt{3}$ m
    Ans: a. $200\sqrt{3}$ m
13. An ant is at a corner of a cubical room of side a. The ant can move with a constant speed u. The minimum time taken to reach the farthest corner of the cube is –
    a. $\frac{3a}{u}$
    b. $\frac{\sqrt{3}a}{u}$
    c. $\frac{\sqrt{5}a}{u}$
    d. $\frac{(\sqrt{2}+1)\,a}{u}$
    Ans: c. $\frac{\sqrt{5}a}{u}$
14. A rocket is launched at earth's surface from rest with a constant acceleration of $10m/s^2$. If the fuel is finished 1.5min after it is launched, then the height it reaches when comes to rest is – (take g = 10m/s^2)
    a. 20.25 km
    b. 10.125 km
    c. 25.25 km
    d. 30.375 km
    Ans: d. 30.375 km
15. A ball is released from the top of a tower of height h metre. It takes T seconds to reach the ground. What is the position of the ball in $\frac{T}{3}$ sec?
    a. $\frac{h}{9}\ m$ from the ground
    b. $\frac{7h}{9}\ m$ from the ground
    c. $\frac{8h}{9}\ m$ from the ground
    d. $\frac{17h}{18}\ m$ from the ground
    Ans: c. $\frac{8h}{9}\ m$ from the ground

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